

REMARKS

In response to the Patent Office Letter of November 23, 2004, the Applicant respectfully requests reexamination and reconsideration. To further the prosecution of this application, amendments have been made herein, newly added claims have been submitted and arguments have been presented that will clearly indicate allowance of all claims in this application.

In the Patent Office Letter, the Examiner has rejected claims 21, 22, 24 and 25 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. The Examiner has referred to the language "its holding pressure." From an illustrative standpoint, the holding pressure relates to the relief valve 4 such as illustrated in Figs. 1A and 2. Please refer also to the present specification at page 11, lines 1-7. The holding pressure is a pressure at or below which the relief valve 4 is maintained closed. This is explained on page 11 where it is indicated that an elevated pressure is introduced through the pressure control valve 10 so that the opening pressure (holding pressure) of the relief valve 4 is exceeded so as to inject the propellant to the mold cavity.

In the Patent Office Letter, the Examiner has rejected claims 1-3, 5-16, 19, 20 and 23 under 35 U.S.C. §103(a) as being unpatentable over the Eckardt et al. U.S. Patent No. 5,093,053.

The Eckardt et al. patent relates to a process for producing foamed articles with a dense skin by injection molding. In this patent, in a first step melt is introduced into the cavity of a mold followed by the introduction of melt with an added blowing agent in a second step, and in a third step an additional gas and/or liquid is injected into the mold. This additional gas and/or liquid is under a pressure exceeding the gas pressure of the blowing agent within the melt and, thus, it forms a hollow space C in the cavity with the melt as shown in Fig. 1. Then, in a further step the pressure of the additional gas/liquid is released or the additional gas/liquid is removed,

thus, allowing the blowing agent in the melt B to expand and foaming the melt, thereby, filling the hollow space left by the gas.

In the Office Action the Examiner stated that the pressure on the blowing agent in Eckardt et al. is certainly lower after addition in order that the layer B can expand. Now, in Eckardt et al. the pressure that the Examiner refers to is the inherent pressure caused internally by the blowing agent mixed with the melt. On the other hand, in accordance with the present invention, the pressure control is that exerted on the blowing agent itself as injected and mixed within the melt. According to the present invention, pressure control is carried out with respect to the blowing agent as such; that is the blowing in the non-mixed state with the melt. According to the present invention, the blowing agent is held under pressure before, between and after the injection phase to the melt. During injection the pressure exerted on the blowing agent is increased. Then, when the desired quantity of blowing agent has been added to the melt, the pressure on the blowing agent is decreased and the injection to the melt is stopped. Thus, the pressure control of the present invention relates to the pressure exerted on the blowing agent as added, rather than to the blowing agent mixed with the melt.

Furthermore, on page 4 of the Office Action, the Examiner states that "one of ordinary skill in the art will recognize that the expanding agent must attain a relatively high pressure before injection in order that it can successfully be added to the melt, and Eckardt et al. teach or suggest maintaining pressure after the injection phase by teaching that additional gas C is introduced, which actually exceeds the pressure of the expanding agent (column 5, lines 26-28)." According to Eckardt et al., increased pressure is exerted on the blowing agent by additional gas C within the cavity only.

Now, contrary to the teaching of Eckardt et al., according to the present invention the blowing agent is added to the melt by increasing the pressure exerted on the blowing agent itself. That is, the elevated pressure is exerted on the blowing agent during feeding to the melt and,

then, the melt with the admixed blowing agent is introduced into the cavity. No additional pressure is exerted to the melt within the admixed blowing agent within the cavity.

Consequently, the pressure regime underlying Eckardt et al. is completely different from the pressure regime according to the present invention. Moreover, Eckardt et al. is silent on the pressure exerted on the blowing agent before, during and after the injection phase.

Furthermore, to clearly distinguish claim 1 over Eckardt et al. amendments have been made therein. These amendments clearly indicate that the propellant injection phase occurs at the moment when the propellant is added to the melt, particularly the second melt portion.

With these amendments and the foregoing arguments, it is believed that claim 1 and all of its related dependent claims should now be found in condition for allowance.

In the Office Action on page 2, the Examiner states that “Hendry et al. disclose or suggest the basic claimed device for the discontinuous metered or measured addition of physical propellants to a foamable melt including a storage means or holding chamber in which the propellant is stored under pressure, a pressure control valve for regulating the propellant pressure, an injection point (it is submitted that the line downstream of the cylinder 21 acts as a throttling means) at which propellant pressure is fed to the melt, a (note: here obviously some wording is missing) wherein a controlled mechanism is provided at the injection point (note valve 22).” The Examiner continued “Hendry et al. appears not to state that the closure mechanism opens upon an increase in pressure above its holding pressure, but this is directed to a method of operation of the device, rather than the structure of the device, the structure now being evaluated.”

As set out in column 4, lines 63 ff of Hendry et al., valve 22 is a solenoid valve which opens as soon as melt 8 within the mold has passed and immersed the outlet end of passageway 19 and the fluid in the cylinder 21 is injected into the passageway 19. Consequently, solenoid valve 22 operates independently from the pressure exerted on the fluid.

The Examiner holds that increase in pressure above the holding pressure would be directed to a method of the operation rather than of the configuration of the device. However, it should be noted that the configuration or design of the valve has to be adapted to the way of operation. According to the present invention the valve is designed such that it is ensured that the valve opens when the pressure exerted on the blowing agent has reached a specific limit and, vice versa, closes when the pressure falls below this limit. Hendry et al., however, is silent as to the suitability of valve 22 to be operated by the action of the pressure exerted on the blowing agent upstream to valve 22. Moreover, valve 22, which is considered by the Examiner to be equivalent to the controlled closure mechanism of the present invention, is certainly not positioned at the injection point (the point at which the blowing agent is fed into the melt) but upstream therefrom.

Now, claim 21 has been amended to now clearly distinguish over the Hendry et al. reference. The device claim 21 now defines the controlled closure mechanism as both being provided at the injection point and opening upon an increase in pressure exerted on the blowing agent upstream of the controlled closure mechanism above its holding pressure.

As indicated previously, according to the present invention the metering of the blowing agent is achieved by pressure control of the blowing agent itself. Pressure control means that the pressure on the blowing agent upstream to the controlled closure mechanism is increased above the holding pressure of the controlled closure mechanism. Due to this increase of pressure exerted on the blowing agent the closure mechanism opens and the expanding agent under increased pressure is fed to the melt. When the desired quantity of the blowing agent has been added to the melt the pressure is decreased and, consequently, the controlled closure mechanism closes and addition of the blowing agent is stopped.

Accordingly, the Hendry et al. patent does not teach particularly the amended device now recited in claim 21 wherein the mechanism opens upon an increase in pressure exerted on the

propellant upstream of the mechanism. In addition, claims dependent from claim 21 should also be found in allowable condition.

With regard to claim 24, a similar amendment has been made in claim 24 to that made in claim 21 and thus claim 24 should also now be found in allowable condition.

According to the present invention it is preferred that there is an intimate mixing of the melt with the blowing agent and, therefore, it is preferred that the injection point is upstream to the spray point x at which the melt with the blowing agent is injected into the cavity (as for example shown in Fig. 1). Consequently, the melt and the blowing agent are preferably injected into the cavity via the same sprue. To the contrary, according to the embodiments of Figs. 1 and 2 of Hendry et al. there are separate injection means for the melt (via sprue 18) and the fluid via the fluid injection passageway (19).

According to all three embodiments of Figs. 1-5 of Hendry et al. the sprue 18 widens conically towards the cavity 12. Due to this widening, the pressure exerted on the fluid is reduced which is disadvantageous in view of premature expansion of the fluid. To the contrary in the present case, the device is designed such, that no premature expansion in volume of the blowing agent under pressure is possible (see page 9, lines 12-14, 25-27 and page 10, lines 1-11).

Accordingly, claims 33 and 34 have been added to the application to recite a further feature of the present invention clearly distinguishing over the Hendry et al. reference. Claims 33 and 34 depend respectively from independent claims 21 and 24.

In order to afford the Applicant a complete scope of claim coverage, the Applicant has also added new claims 26-32 to this application. Claim 26 is an independent claim and claims 27-32 are claims dependent from claim 26.

Claim 26 is a process claim that sets forth a first stage in an initial filling step in which a propellant free first melt is fit into the mold cavity. This is followed by a second stage in a propellant injection phase in which there is a concurrent injection into the mold cavity of a

physical propellant and a second melt portion. The metering of the physical propellant is defined as in a pressure regulated manner. Lastly, claim 26 defines the pressure as directly exerted on the propellant alone during the propellant injection phase and being greater than the pressure exerted on the propellant in the phases before and after.

Claim 26 is patentably distinguishable over the prior art cited by the Examiner, particularly the Eckardt et al. reference for the same reasons as previously stated in connection with claim 1. The dependent claims 27-32 should thus also be found in allowable condition.

CONCLUSION

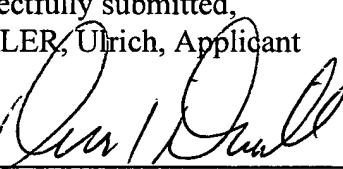
In view of the foregoing amendments and remarks, the Applicant respectfully submits that all of the claims pending in the above-identified application are in condition for allowance, and a notice to that effect is earnestly solicited.

If the present application is found by the Examiner not to be in condition for allowance, then the Applicant hereby requests a telephone or personal interview to facilitate the resolution of any remaining matters. Applicant's attorney may be contacted by telephone at the number indicated below to schedule such an interview.

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